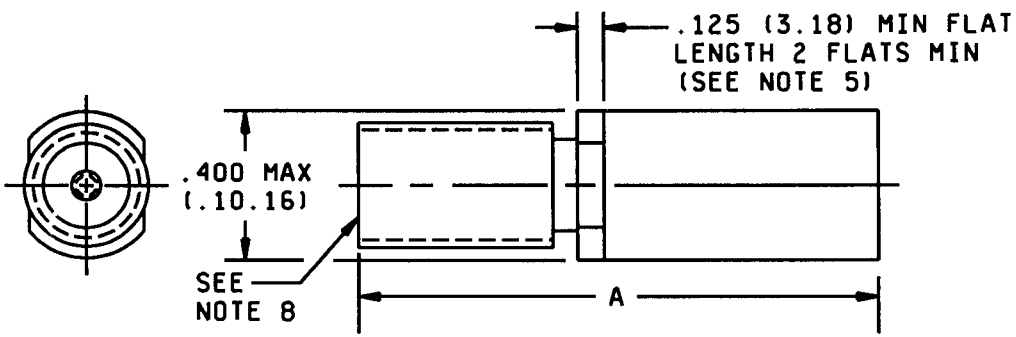
NOTE: The document identifier and heading has been changed on this page to reflect that this is a performance specification. There are no other changes to this document. The document identifier on subsequent pages has not been changed, but will be changed the next time this document is revised.

PERFORMANCE SPECIFICATION

CONNECTORS, PLUGS, ELECTRICAL, COAXIAL, RADIO FREQUENCY, (SERIES SMA (CABLED) - SOCKET CONTACT, CLASS 2)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

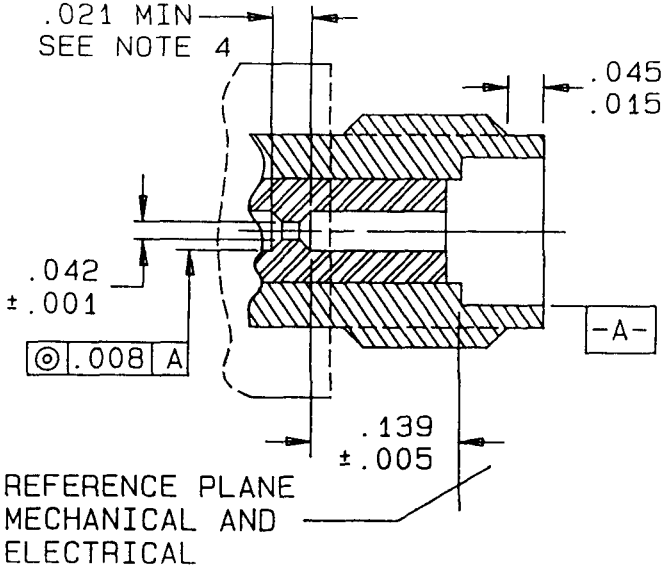
The requirements for acquiring the product described herein shall consist of this specification sheet and the issue of the following specification listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation: MIL-PRF-39012.



MARKING IMPLEMENTATION DATE, CATEGORY B, SEE TABLE VII

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. For dimension A, see tables I and V.
4. Dimension .400 (10.16) is the largest overall diameter of the connector.
5. Wrench flats are to accommodate standard wrench openings in accordance with FED-STD-H28, appendix 10.
6. Dimension A defines the overall length of connector when assembled to the cable.
7. All undimensioned pictoral configurations are for reference purposes only.
8 Series SMA, socket contact interface in accordance with MIL-STD-348.
9. Metric equivalents are in parentheses.

FIGURE 1. General configuration.



CATEGORY D

Inches	mm	Inches	mm	Inches	mm
.001	0.03	.0355	0.902	.115	2.92
.002	0.05	.0370	0.940	.139	3.53
.005	0.13	.042	1.07	.168	4.27
.008	0.20	.045	1.14	.170	4.32
.010	0.25	.049	1.24	.1810	4.60
.015	0.38	.051	1.30	.208	5.28
.021	0.53	.074	1.88	.216	5.49
.030	0.76	.078	1.98	.218	5.54
				.250	6.35

NOTES:
1. Dimensions are in inches.
2. Slitting of inner contact optional.
3. Metric equivalents are given for general information only.
4. Chamfer is optional, if chamfer is used put on a 30° maximum.

FIGURE 2. Category D captivation detail.

TABLE I. Dash numbers, cross reference and dimensions.

Dash number	Applicable cable ≈	Dimensions	Inches-millimeters maximum 1/
Category A - Field serviceable (no special tools required) 2/			
3006 3/ 4006 3/	M17/93-RG178* M17/169-00001ϕ	A	.960(24.38)
3007 3/ 4007 3/	M17/119-RG174 M17/173-00001ϕ M17/113-RG316* M17/172-00001ϕ		
3008 3/ 4008 3/	M17/54-RG122* M17/157-00001ϕ		
3009 3/ 4009 3/	M17/28-RG058 M17/60-RG142@ M17/84-RG223* M17/155-00001ϕ M17/158-00001ϕ M17/167-00001ϕ		
3010 3/ 4010 3/	M17/111-RG303*@ M17/170-00001ϕ		
3030 3/ 4030 3/	M17/152-00001		
Category C - Field replaceable (MIL-C-22520/5-01 basic crimp tool) 4/			
3025 3/ 4025 3/	M17/93-RG178∞* M17/169-00001∞ϕ	A	1.265(32.13)
3026 3/ 4026 3/	M17/119-RG174Σ M17/173-00001Σϕ M17/113-RG316Σ*		
3027 3/ 4027 3/	M17/54-RG122*& M17/157-00001ϕ&		

See footnotes at end of table.

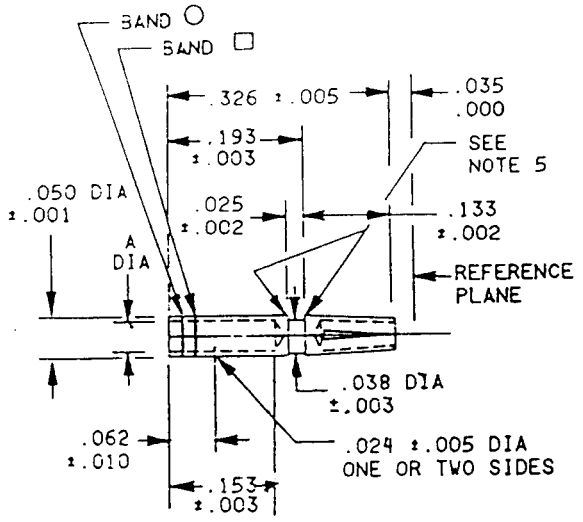
TABLE I. Dash numbers, cross reference and dimensions - Continued.

Dash number	Applicable cable ≈	Dimensions	Inches-millimeters maximum 1/
Category C - Field replaceable (MIL-C-22520 crimp tool) 4/			
3028 3/ 4028 3/	M17/60-RG142@~* M17/158-00001-ϕ M17/167-00001-ϕ M17/84-RG223≈	A	1.265(32.13)
3029 3/ 4029 3/	M17/155-00001-ϕ M17/28-RG058*~ M17/111-RG303~ M17/170-00001-ϕ		
Category D - Field replaceable - Defined piece parts 4/ 6/ 5/			
[illegible] 3/ 4502 3/	M17/60-RG142@* M17/158-00001ϕ M17/128-RG400 M17/175-00001ϕ	A	1.265(32.13)

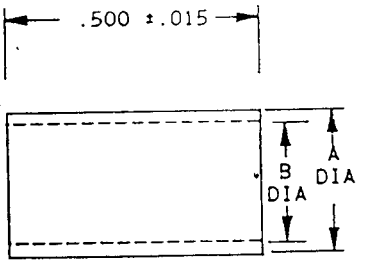
1/ Millimeters are in parentheses.
2/ All corrosion resistant steel bodied connectors which are designed to be assembled to the cable outer conductor using solder shall be gold plated in accordance with MIL-G-45204, type II, class I.
3/ These connectors have captivated center contacts.
4/ These connectors are assembled, using the applicable crimp tool, to the specified cables stripped as shown on figure 4.
5/ Not for use in army equipment.
6/ Complete connector assembly shall consist of a body, center contact, ferrule, and assembly instructions.

≈ The latest version of each cable shall be applicable.
★ Cable to be used when performing tests requiring cable except as in note Σ.
@ Cable to be used for the +200°C thermal shock tests.
∞ Preferred die M22520/5-33 closure B, alternate die M22520/5-03 closure B.
Σ Preferred die M22520/5-35 closure B, alternate die M22520/5-03 closure A.
& Preferred die M22520/5-41 closure B, alternate die M22520/5-05 closure B, or -09 closure A.
~ Preferred die M22520/5-19 closure B, alternate die M22520/5-05 closure A or -11, -57, closure A.
ϕ Caution is directed to the application of this cable above 400 MHz. Attenuation is tested only at 400 MHz. SRL and power handling capabilities are not stipulated herein.

NOTE: Connectors mate with connectors of the same material only; i.e., M39012/57-3001 mates with M39012/55-3001, and M39012/57-4001 mates with M39012/55-4001.



CENTER CONTACT



CRIMP FERRULE

Dash number	Contact number 2/	A ±.001	Basic crimp tool 1/	Crimp die or positioner	Crimp tensile minimum	Color band □	Color band ○
3502 4502	57-10	.041	M22520/1-01	Solder or M22520/1-15	4 pounds	Red	Maroon

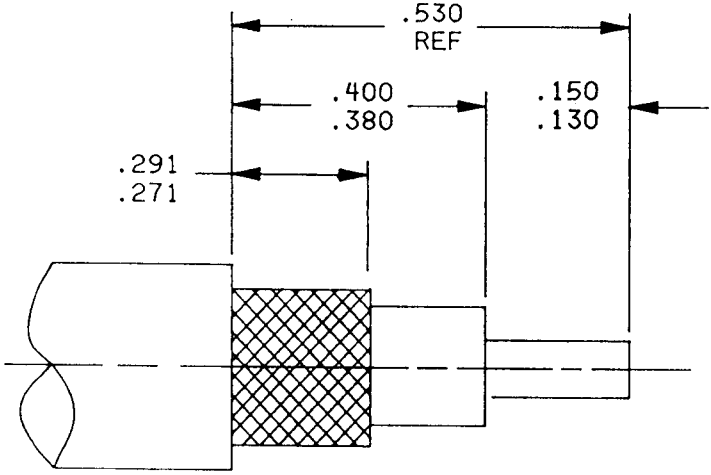
Dash number	Ferrule number 2/	A ±.003	B ±.003	Basic crimp tool 1/	Crimp die or positioner M22520/5-
3502 4502	57-50	.250	.220	M22520/5-01	-11, -05, -57 closure Closure A and -19 Closure B

Inches	mm
.001	0.03
.002	0.05
.003	0.08
.005	0.13
.010	0.25
.015	0.38
.024	0.61
.035	0.89
.038	0.97
.041	1.04
.050	1.27
.062	1.57
.133	3.38
.153	3.89
.193	4.90
.220	5.59
.250	6.35
.326	8.28
.500	12.70

1/ Class 2 tool may be used by OEM (see MIL-C-22520).
2/ Contact numbers and ferrule numbers are for identification only.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Crimp tensile test shall be in accordance with MIL-C-39029.
4. Copyright notice: All information disclosed in these specification sheets which is or may be copyrighted is reproduced herein with the express permission of the copyright owner.
5. .003 maximum break.
6. Color bands shall be positioned so that no coloring material enters the inspection hole.

FIGURE 3. Contact and ferrule dimensions for category D only.



Inches	mm
.130	3.30
.150	3.81
.271	6.88
.291	7.39
.380	9.65
.400	10.16
.530	13.46

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 4. Cable stripping dimensions for field replaceable connectors.

ENGINEERING DATA:

Nominal impedance: 50 ohms.

Frequency range: 0 to 12,400 MHz.

Voltage rating: The voltage rating shall be in accordance with table II.

TABLE II. Voltage rating.

Cables	Voltage max (at sea level)	Voltage max (70,000 ft)
	V rms	V rms
M17/93-RG178, M17/169-00001	170	45
M17/054-RG122, M17/157-00001, M17/119-RG174, M17/173-00001, M17/113-RG316, M17/172-00001 M17/152-00001	250	65
M17/028-RG058, M17/155-00001, M17/060-RG142, M17/158-00001, M17/084-RG223, M17/167-00001, M17/111-RG303, M17/170-00001, M17/128-RG400, M17/175-00001	335	85

Temperature rating: -65°C to +165°C.

REQUIREMENTS:

Dimensions and configuration: See figure 1.

Force to engage and disengage:

Longitudinal force: Not applicable.

Torque: 2 inch-pounds, maximum.

Coupling proof torque: Not applicable.

Inspection conditions: For each test of threaded coupling connector where the test is performed on mated pairs, the pairs shall be torqued to 7 to 10 inch-pounds.

Mating characteristics:

Reference MIL-STD-348 and figure 5 dimensions.

Center contact (socket):

Oversize test pin: .0375+.0001.

Test pin finish: 16 microinches.

Insertion depth: .030/.045.

Number of insertions: 3.

Insertion force test: Steel test pin diameter .0370+.0001.

Insertion depth: .050/.075.

Test pin finish: 16 microinches.

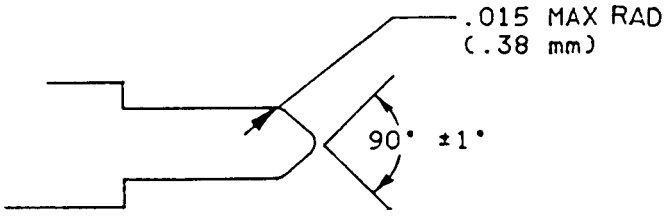
Insertion force: 2 pounds, maximum.

Withdrawal force test: Steel test pin diameter .0355 - .0001.

Insertion depth: .050/.075.

Withdrawal force: 1 ounce, minimum.

Test pin finish: 16 microinches.



NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 5. Test pin data.

Hermetic seal: Not applicable.

Leakage (pressurized connectors): Not applicable.

Insulation resistance: Method 302 of MIL-STD-202, test condition B. 5,000 megohms, minimum.

Center contact retention: 6 pounds, minimum axial force. Applicable to captivated-center-contact connectors only.

Radial torque: Not applicable.

Corrosion (salt spray): Method 101 of MIL-STD-202, test condition B.

Voltage standing wave ratio (VSWR): From 0.5 to 12.4 GHz, or approximately 80 percent of the cutoff frequency of the test cable, whichever is lower.

Cables	VSWR
M17/93-RG178	1.20+0.025 (F) GHz
M17/054-RG122, M17/119-RG174, M17/113-RG316, M17/152-00001	1.15+0.02 (F) GHz
M17/028-RG058, M17/060-RG142, M17/084-RG223, M17/111-RG303, M17/128-RG400	1.15+0.01 (F) GHz

Swept frequency VSWR test setup:

Item 6: VSWR shall be less than 1.025+.002 F (F in GHz).

Item 16: VSWR shall be less than 1.025+.002 F (F in GHz).

Second step of VSWR checkout procedure - VSWR shall be less than 1.080+.005 F (F in GHz).

Group B inspection: Use step 5, long cable method.

Qualification and group C inspection: Use step 5, long cable method.

Connector durability:

Insertion and withdrawal force: 500 cycles, minimum at 12 cycles per minute, maximum. The connector shall meet the mating characteristics and force to engage and disengage requirements.

Contact resistance: In milliohms, maximum.

	Initial	After environment
Center contact:	3.0	4.0
Outer contact:	2.0	Not applicable
Braid to body:	0.5 1/	Not applicable

Dielectric withstanding voltage at sea level:

Method 301 of MIL-STD-202.

Cables	V rms
M17/93-RG178, M17/169-00001	500
M17/054-RG122, M17/157-00001, M17/119-RG174, M17/173-00001, M17/113-RG316, M17/172-00001, M17/152-00001	750
M17/028-RG058, M17/155-00001, M17/060-RG142, M17/158-00001, M17/084-RG223, M17/167-00001, M17/111-RG303, M17/170-00001, M17/128-RG400, M17/175-00001	1,000

Vibration, high frequency: Method 204 of MIL-STD-202, test condition D. No discontinuity permitted.

Shock: Method 213 of MIL-STD-202, test condition I. No discontinuity permitted.

Thermal shock: Method 107 of MIL-STD-202, test condition B, except test high temperature shall be +85°C. High temperature shall be +200°C for connectors using +200°C cables (see tables I and V).

Moisture resistance: Method 106 of MIL-STD-202. No measurements at high humidity. Insulation resistance shall be at least 200 megohms within 5 minutes after removal from humidity.

1/ Five milliohms are permissible on passivated steel bodied connectors.

Corona level:

Altitude - 70,000 feet.

Cables	Volts (min)
M17/93-RG178, M17/169-00001	125
M17/054-RG122, M17/157-00001, M17/119-RG174, M17/173-00001, M17/113-RG316, M17/172-00001, M17/152-00001	190
M17/028-RG058, M17/155-00001, M17/060-RG142, M17/158-00001, M17/084-RG223, M17/167-00001, M17/111-RG303, M17/170-00001, M17/128-RG400, M17/175-00001	250

RF high potential withstanding voltage:

Frequency: 5 to 7.5 MHz

Leakage current: Not applicable.

Cables	Volts (min)
M17/93-RG178, M17/169-00001	335
M17/054-RG122, M17/157-00001, M17/119-RG174, M17/173-00001, M17/113-RG316, M17/172-00001, M17/152-00001	500
M17/028-RG058, M17/155-00001, M17/060-RG142, M17/158-00001, M17/084-RG223, M17/167-00001, M17/111-RG303, M17/170-00001, M17/128-RG400, M17/175-00001	670

Cable retention force: The cable retention force shall be in accordance with table III.

TABLE III. Cable retention force.

Cable dielectric outer diameter	Pounds (min)	
	Single braid	Double braid
Inches (max)		
.036	10	N/A
.067	20	N/A
.110	30	N/A
.122	40	45

Coupling mechanism retention force: Not applicable.

RF leakage: -60 dB minimum tested at a frequency between 2 and 3 GHz.

RF insertion loss: dB max = .06 x $\sqrt{\text{freq GHz}}$. Test frequency at 6.0 GHz.

Part number: M39012/57 (dash number from table I or "B" number from table V).

Swept frequency VSWR test setup:

Item 6: VSWR shall be less than 1.025+.002 F (F in GHz).

Item 16: VSWR shall be less than 1.025+.002 F (F in GHz).

Second step of VSWR checkout procedure - VSWR shall be less than 1.080+.005 F (F in GHz).

Group B inspection: Use step 5, long cable method.

Qualification and group C inspection: Use step 5, long cable method.

Connector durability:

Insertion and withdrawal force: 500 cycles, minimum at 12 cycles per minute, maximum. The connector shall meet the mating characteristics and force to engage and disengage requirements.

Contact resistance: In milliohms, maximum.

	Initial	After environment
Center contact:	3.0	4.0
Outer contact:	2.0	Not applicable
Braid to body:	0.5 1/	Not applicable

Dielectric withstanding voltage at sea level:

Method 301 of MIL-STD-202.

Cables	V rms
M17/93-RG178, M17/169-00001	500
M17/054-RG122, M17/157-00001, M17/119-RG174, M17/173-00001, M17/113-RG316, M17/172-00001, M17/152-00001	750
M17/028-RG058, M17/155-00001, M17/060-RG142, M17/158-00001, M17/084-RG223, M17/167-00001, M17/111-RG303, M17/170-00001, M17/128-RG400, M17/175-00001	1,000

Vibration, high frequency: Method 204 of MIL-STD-202, test condition D. No discontinuity permitted.

Shock: Method 213 of MIL-STD-202, test condition I. No discontinuity permitted.

Thermal shock: Method 107 of MIL-STD-202, test condition B, except test high temperature shall be +85°C. High temperature shall be +200°C for connectors using +200°C cables (see tables I and V).

Moisture resistance: Method 106 of MIL-STD-202. No measurements at high humidity. Insulation resistance shall be at least 200 megohms within 5 minutes after removal from humidity.

1/ Five milliohms are permissible on passivated steel bodied connectors.

Corona level:

Altitude - 70,000 feet.

Cables	Volts (min)
M17/93-RG178, M17/169-00001	125
M17/054-RG122, M17/157-00001, M17/119-RG174, M17/173-00001, M17/113-RG316, M17/172-00001, M17/152-00001	190
M17/028-RG058, M17/155-00001, M17/060-RG142, M17/158-00001, M17/084-RG223, M17/167-00001, M17/111-RG303, M17/170-00001, M17/128-RG400, M17/175-00001	250

RF high potential withstanding voltage:

Frequency: 5 to 7.5 MHz

Leakage current: Not applicable.

Cables	Volts (min)
M17/93-RG178, M17/169-00001	335
M17/054-RG122, M17/157-00001, M17/119-RG174, M17/173-00001, M17/113-RG316, M17/172-00001, M17/152-00001	500
M17/028-RG058, M17/155-00001, M17/060-RG142, M17/158-00001, M17/084-RG223, M17/167-00001, M17/111-RG303, M17/170-00001, M17/128-RG400, M17/175-00001	670

Cable retention force: The cable retention force shall be in accordance with table III.

TABLE III. Cable retention force.

Cable dielectric outer diameter	Pounds (min)	
	Single braid	Double braid
Inches (max)		
.036	10	N/A
.067	20	N/A
.110	30	N/A
.122	40	45

Coupling mechanism retention force: Not applicable.

RF leakage: -60 dB minimum tested at a frequency between 2 and 3 GHz.

RF insertion loss: dB max = .06 x $\sqrt{\text{freq GHz}}$. Test frequency at 6.0 GHz.

Part number: M39012/57 (dash number from table I or "B" number from table V).

TABLE IV. Group qualification and retention testing.

Group	Submission and qualification of any of the following connectors 1/ 2/	Qualifies the following connectors
I	M39012/57- X009	M39012/57- X006 M39012/57- X007 M39012/57- X008 M39012/57- X009 M39012/57- X010
II	M39012/57B X015	M39012/57B X011 M39012/57B X012 M39012/57B X013 M39012/57B X014 M39012/57B X015 M39012/57B X016 M39012/57B X017
III	M39012/57B X022	M39012/57B X018 M39012/57B X019 M39012/57B X020 M39012/57B X021 M39012/57B X022 M39012/57B X023 M39012/57B X024
IV	M39012/57- X028	M39012/57- X025 M39012/57- X026 M39012/57- X027 M39012/57- X028 M39012/57- X029
V	M39012/57- X502	M39012/57- X502

1/ Individual connectors other than listed are self qualifying only.

2/ Qualification of connectors qualifies connectors of the same body material and finish only.

X denotes material.

NOTES:

1. For qualification retention, where more than one part is listed in a group in this column, data may be supplied on any of those parts in order to retain qualification for those parts in the corresponding right hand column. The part does not necessarily have to be the part initially qualified.

2. If a connector manufacturer produces a connector which meets all the requirements for two or more connector part numbers (within the same series), the manufacturer may receive qualification approval for two or more connector part numbers by qualifying the one connector. It is not necessary that such connectors be in the same group. Each connector, however, must be marked with its own appropriate part number. For group qualification, the connectors must be of similar design.

TABLE V. Category B - Nonfield replaceable (special tools may be required).

Not for Air force or Navy use. For OEM use only

M39012/57B	Applicable cable number ≤	Dimensions	Inches-millimeters maximum 1/ 2/
3011 3/ 4/ 4011 3/ 4/	M17/93-RG178* M17/169-00001ϕ		
3012 3/ 4/ 4012 3/ 4/	M17/119-RG174 M17/173-00001ϕ M17/113-RG316* M17/172-00001ϕ		
3013 3/ 4/ 4013 3/ 4/	M17/54-RG122* M17/157-00001ϕ		
3014 3/ 4/ [illegible]	M17/28-RG058*	A	1.265 (32.13)
3015 3/ 4/ 4015 3/ 4/	M17/60-RG142*@ M17/158-00001ϕ		
3016 3/ 4/ 4016 3/ 4/	M17/84-RG223* M17/167-00001ϕ		
3017 3/ 4/ 4017 3/ 4/	M17/111-RG303* M17/170-00001ϕ		
3018 5/ 4018 5/	M17/93-RG178* M17/169-00001ϕ		
3019 5/ 4019 5/	M17/119-RG174 M17/173-00001ϕ M17/113-RG316* M17/172-00001ϕ		
3020 5/ 4020 5/	M17/54-RG122* M17/157-00001ϕ		
3021 5/ 4021 5/	M17/28-RG058* M17/155-00001ϕ		

See footnotes at end of table.

TABLE V. Category B - Nonfield replaceable (special tools may be required) - Continued.

Not for Air force or Navy use. For OEM use only

M39012/57B	Applicable cable number	Dimensions	Inches-millimeters maximum 1/ 2/
3022 5/ 4022 5/	M17/60-RG142*@ M17/158-00001ϕ	A	1.265(32.13)
3023 5/ 4023 5/	M17/84-RG223* M17/167-00001ϕ		
3024 5/ 4024 5/	M17/111-RG303* M17/170-00001ϕ		

1/ Millimeters are in parentheses.

2/ All corrosion resistant steel bodied connectors which are designed to be assembled to the cable outer conductor using solder shall be gold plated in accordance with MIL-G-45204, type II, class I.

3/ These connectors will be furnished with noncaptive center contacts by 1 January 1985.

4/ Inactive for new design.

5/ These connectors have captivated center contacts.

≈ The latest version of each cable shall be applicable.

★ Cable to be used when performing tests requiring cable except as in note Σ.

@ Cable to be used for the +200°C thermal shock tests.

ϕ Caution is directed to the application of this cable above 400 MHz. Attenuation is tested only at 400 MHz. SRL and power handling capabilities are not stipulated herein.

NOTE: Connectors mate with connectors of the same material only; Example: M39012/58-3001 mates with M39012/55-3001, and M39012/58-4001 mates with M39012/55-4001.

TABLE VI. Maintenance replacements for category B.

Category B number*	Category C dash number	Category A dash number	Category D dash number
BX011	X025	X006	---
BX012	X026	X007	---
BX013	X027	X008	---
BX014	X029	X009	---
BX015	X028	X009	X502
BX016	X028	X009	---
BX017	X029	X010	---
BX018	X025	X006	---
BX019	X026	X007	---
BX020	X027	X008	---
BX021	X029	X009	---
BX022	X028	X009	X502
BX023	X028	X009	---
BX024	X029	X010	---

* Category B connectors are for original installation only. They will not be stocked or acquired by the Government.

X denotes material.

The material of the item shall be the same material as the item being replaced. Example: 55-3011 (corrosion resistant steel) replaces 55-3025.

TABLE VII. Cross reference of part numbers.

Part number M39012/57B 1/	Superseded part number M39012/57-
BX011	011
BX012	012
BX013	013
BX014	014
BX015	015
BX016	016
BX017	017
BX018	018
BX019	019
BX020	020
BX021	021
BX022	022
BX023	023
BX024	024

1/ The 'B' part number is required marking for connectors manufactured after 3 April 1987. The connectors that are in stock or distribution that were previously qualified and marked with the old part number shall also be considered acceptable for Government use until stock is purged. (Applies to category 'B' part number change only; M39012/XXBXXXX).

The material of the item shall be the same material as the item being replaced. Example: 55B3011 (corrosion resistant steel) replaces 55-3025.

Revision letters are not used to denote changes due to the extensiveness of the changes.

CONCLUDING MATERIAL

Custodians:
Army - CR
Navy - EC
Air Force - 85
NASA - NA

Review activities:
Army - EA, MI
Navy - SH
Air Force - 11, 17, 99
DLA - ES

User activities:
Army - AT, AV
Navy - AS, MC, OS, SH
Air Force - 19

Preparing activity:
Army - CR

Agent:
DLA - ES

(Project 5935-3754-03)